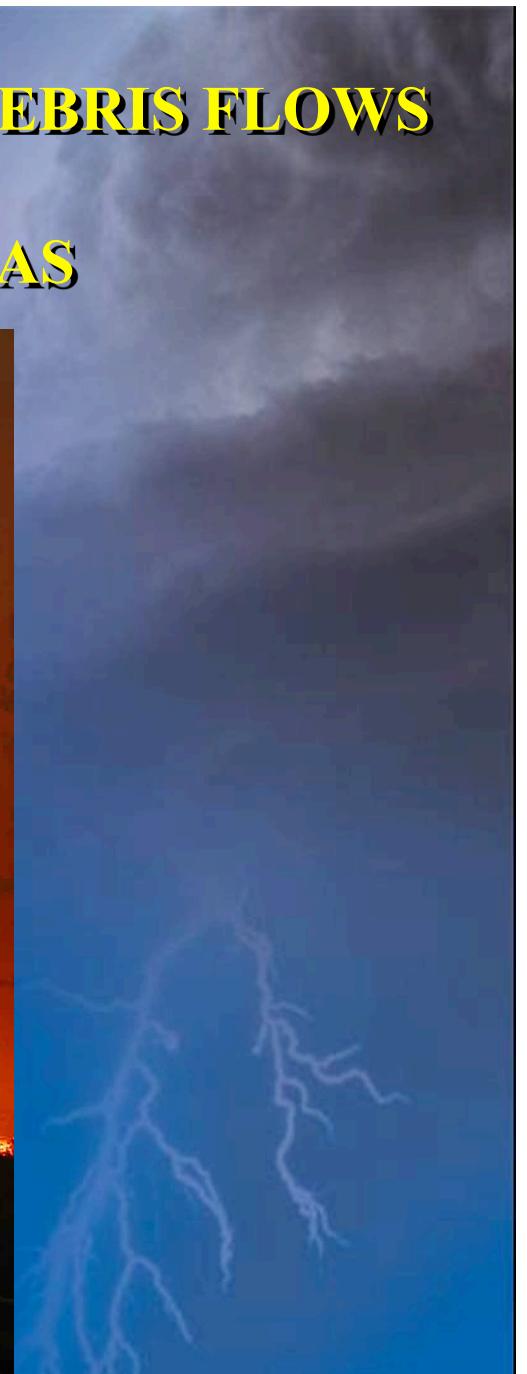




PREDICTING FLASH FLOODS AND DEBRIS FLOWS IN FOREST FIRE BURN AREAS



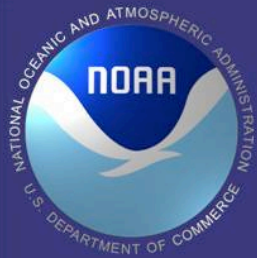
weather.gov

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Overview

- **Coordination Efforts**
- **Weather Forecasting Technology**
- **History of Events (2001-2010)**



COORDINATION EFFORTS



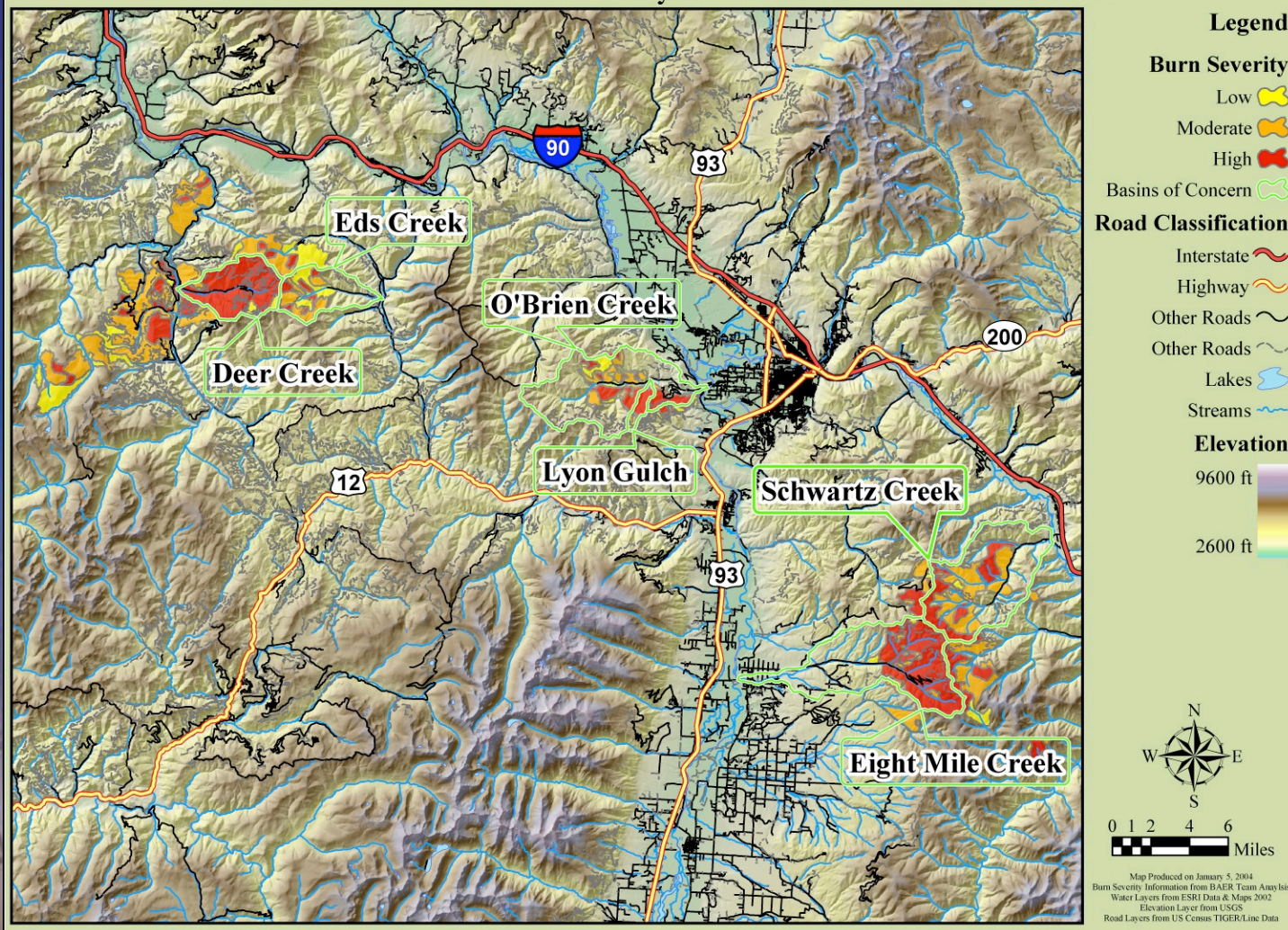


COORDINATION EFFORTS



BAER Teams

Flash Flood Prone Areas caused by Missoula Area Wildfires of 2003



weather.gov

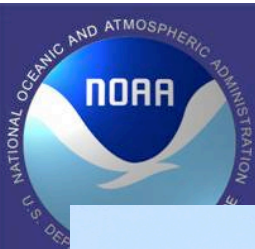
NOAA National Weather Service



COORDINATION EFFORTS



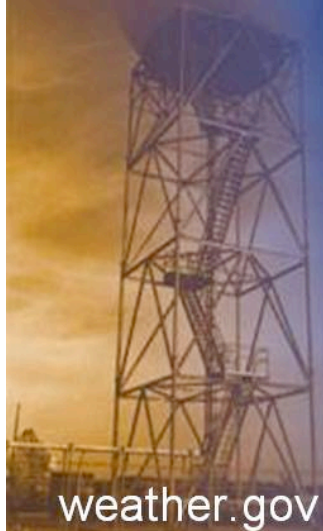
Blackcat Burn Area near Missoula 2007



COORDINATION EFFORTS



Early Warning Precipitation Gage in Lyons Gulch Burn Area near Missoula 2003





COORDINATION EFFORTS



USGS river Gage and rain gage (Laird Creek) 2000





COORDINATION EFFORTS

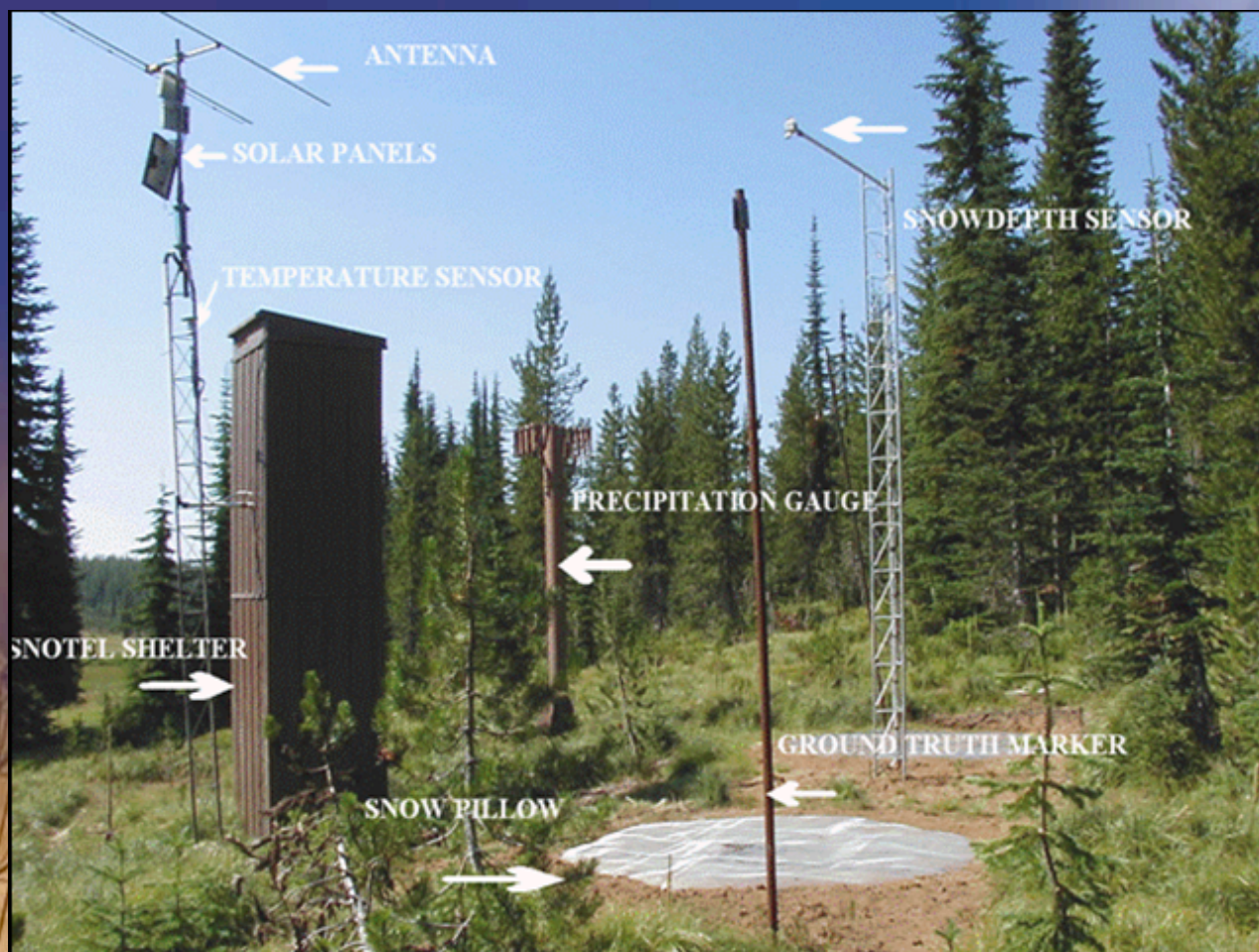


Remote Automated Weather Station in Glacier National Park - 2003





COORDINATION EFFORTS



SNOTEL Site



Weather Forecasting Technology

weather.gov

NOAA National Weather Service



Weather Forecasting Technology

Atmospheric Models

Radar Imagery

Satellite Imagery

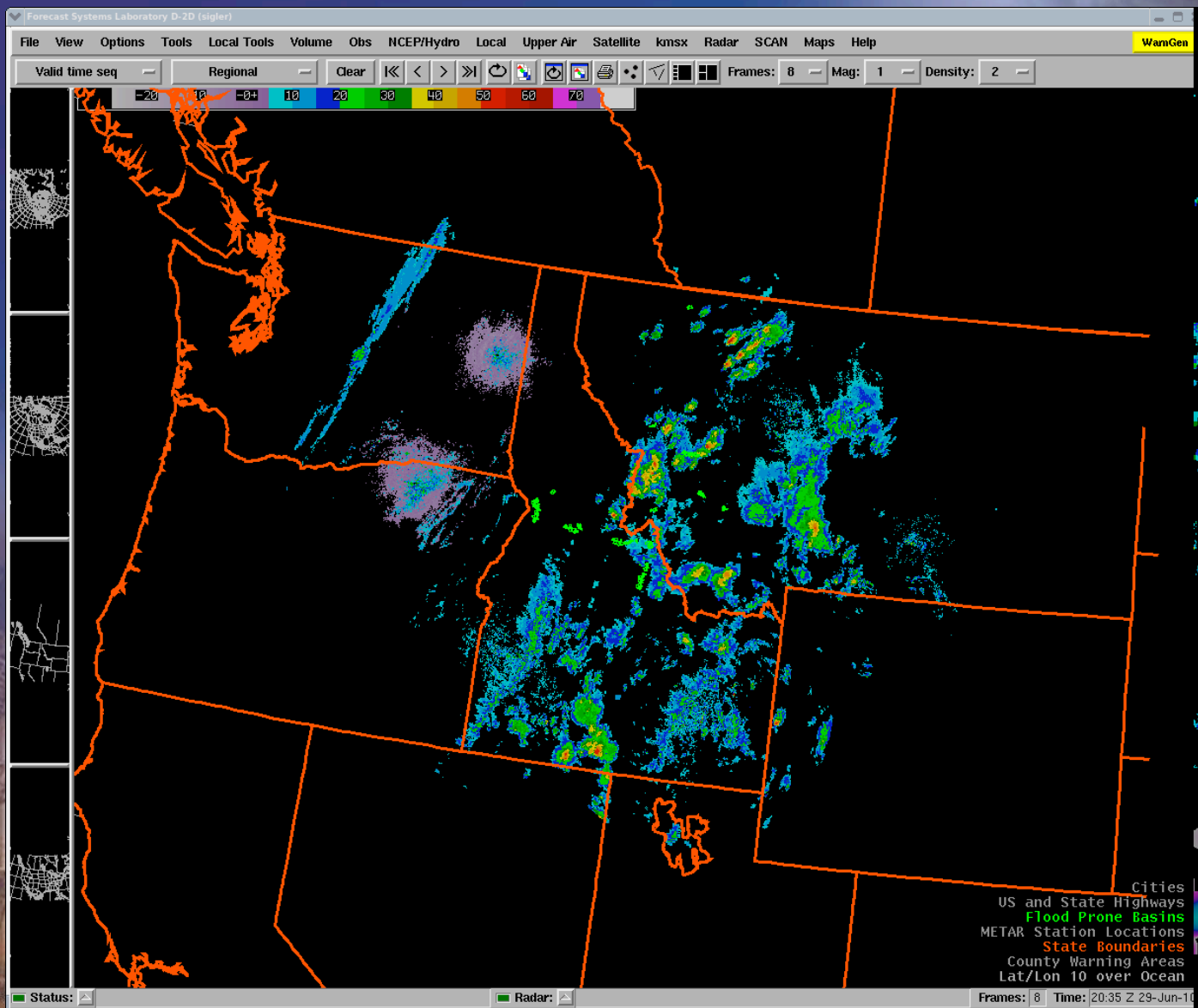


weather.com

National Weather Service



Radar

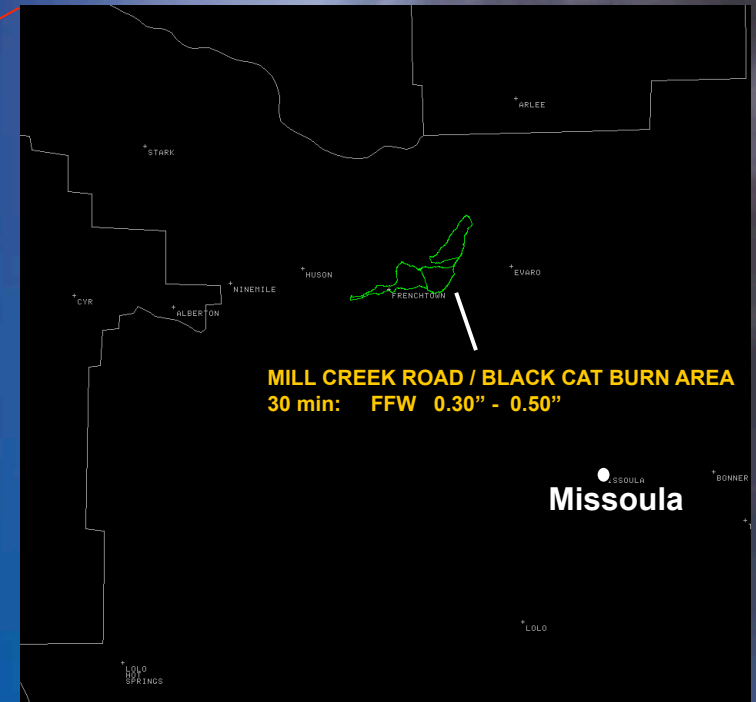
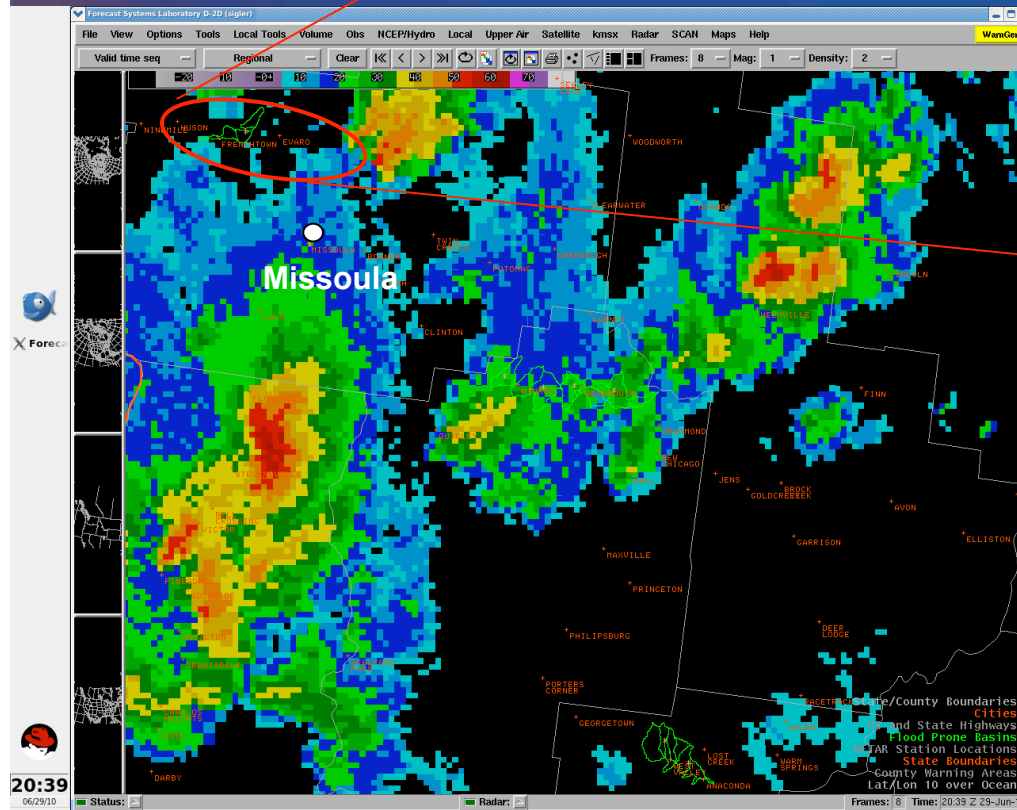


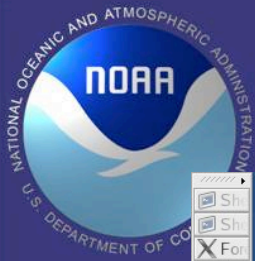
weather.

Weather Service

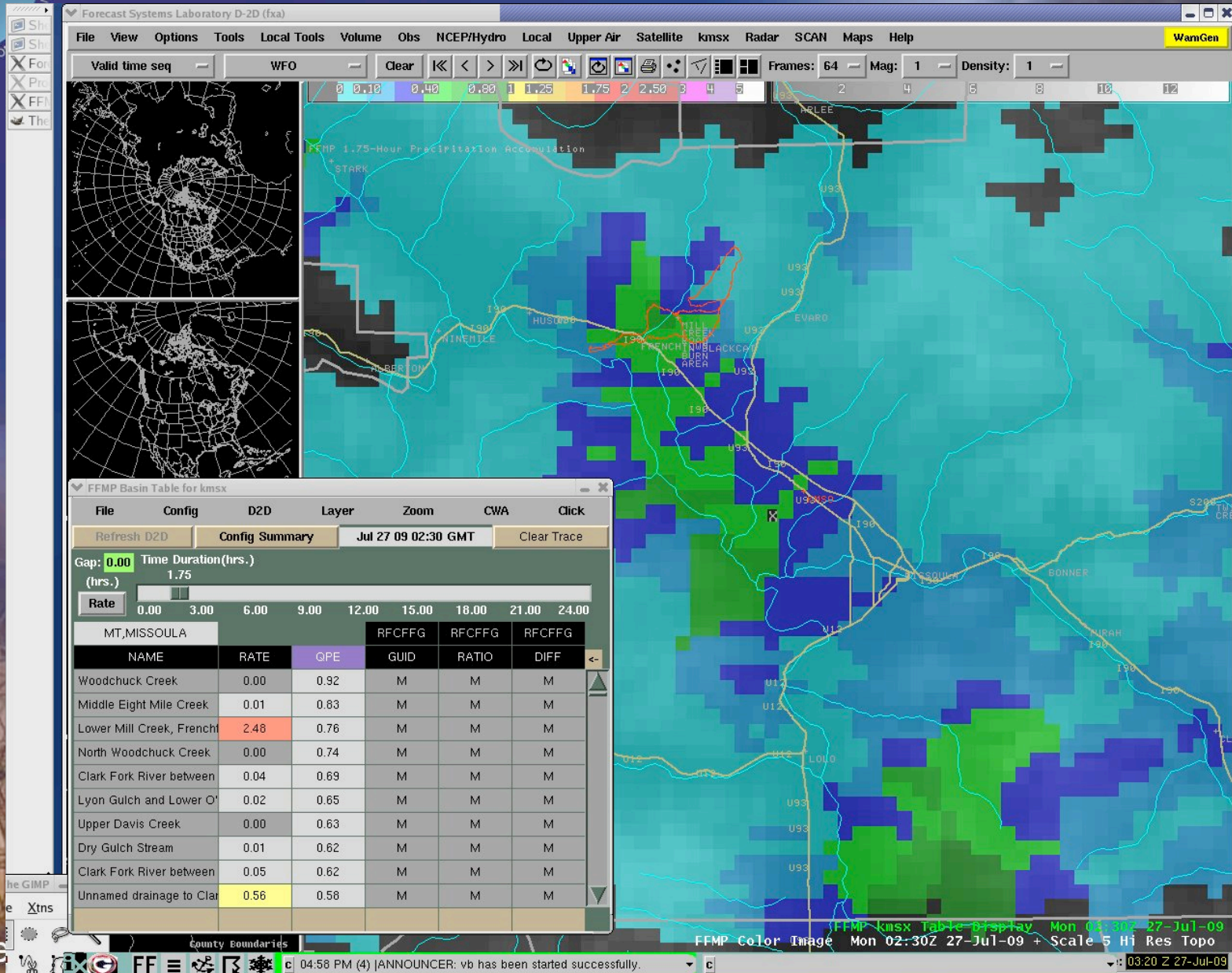


Radar





Radar Rainfall Estimates

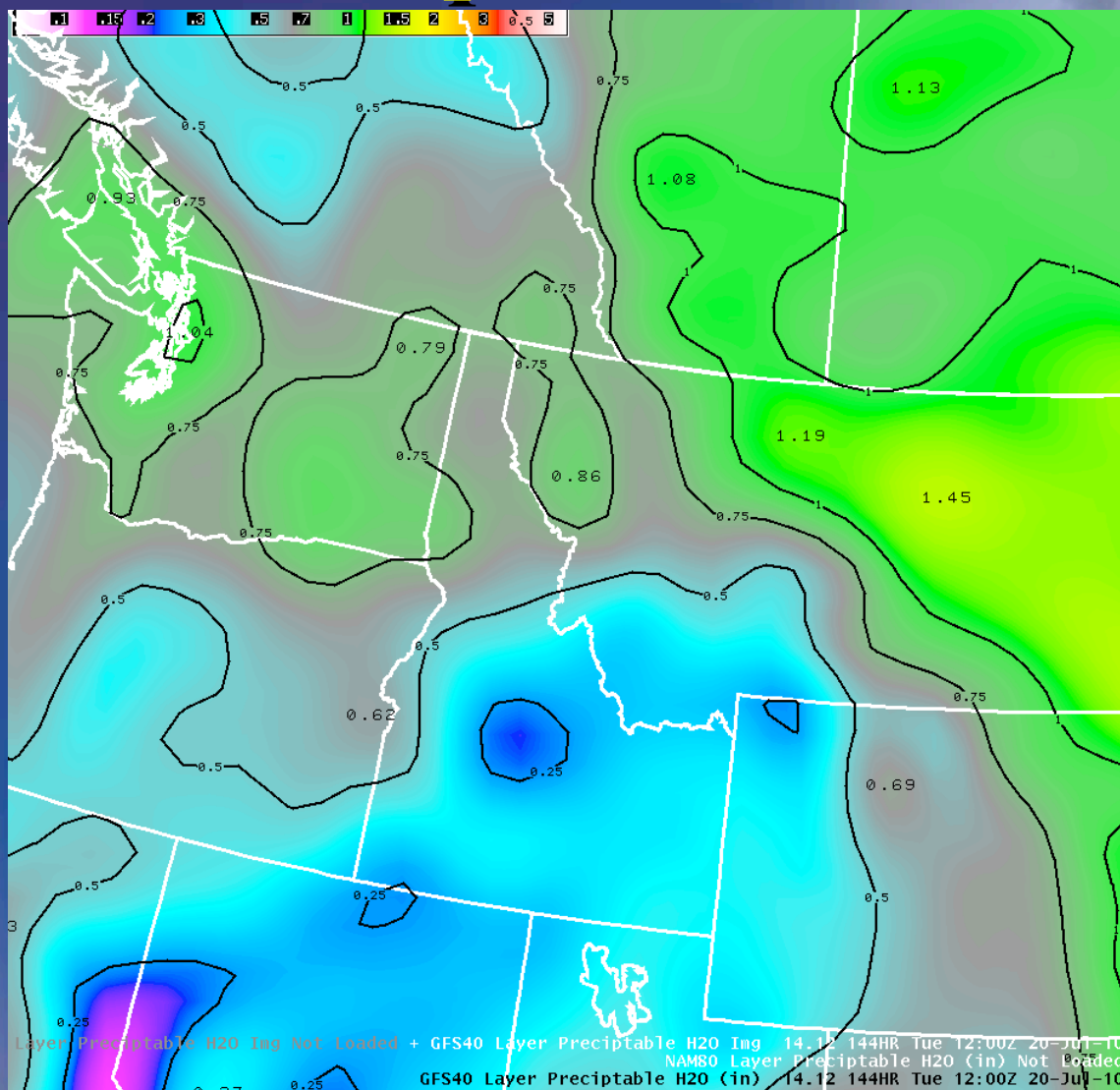


weather

Service



Atmospheric Models



Precipitable water around 1 inch



History of Events (2001- 2010)

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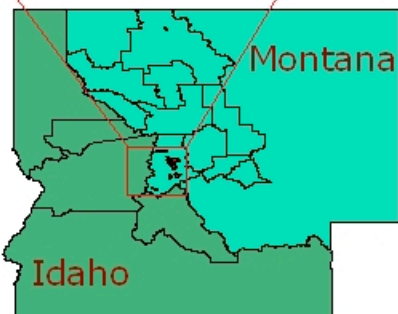


Bitterroot National Forest

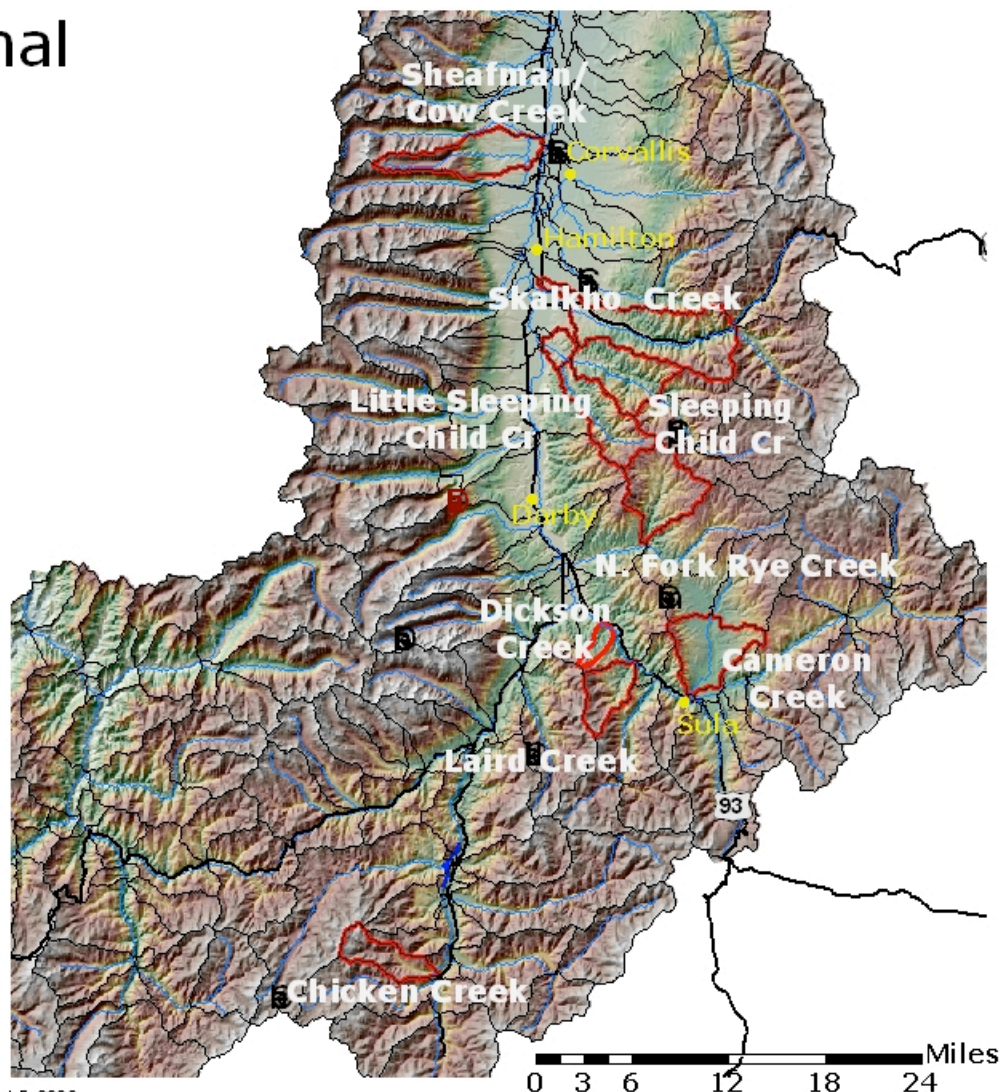
Fires of 2000 Watersheds with Burned Areas

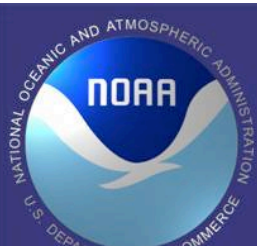


Area of Concern

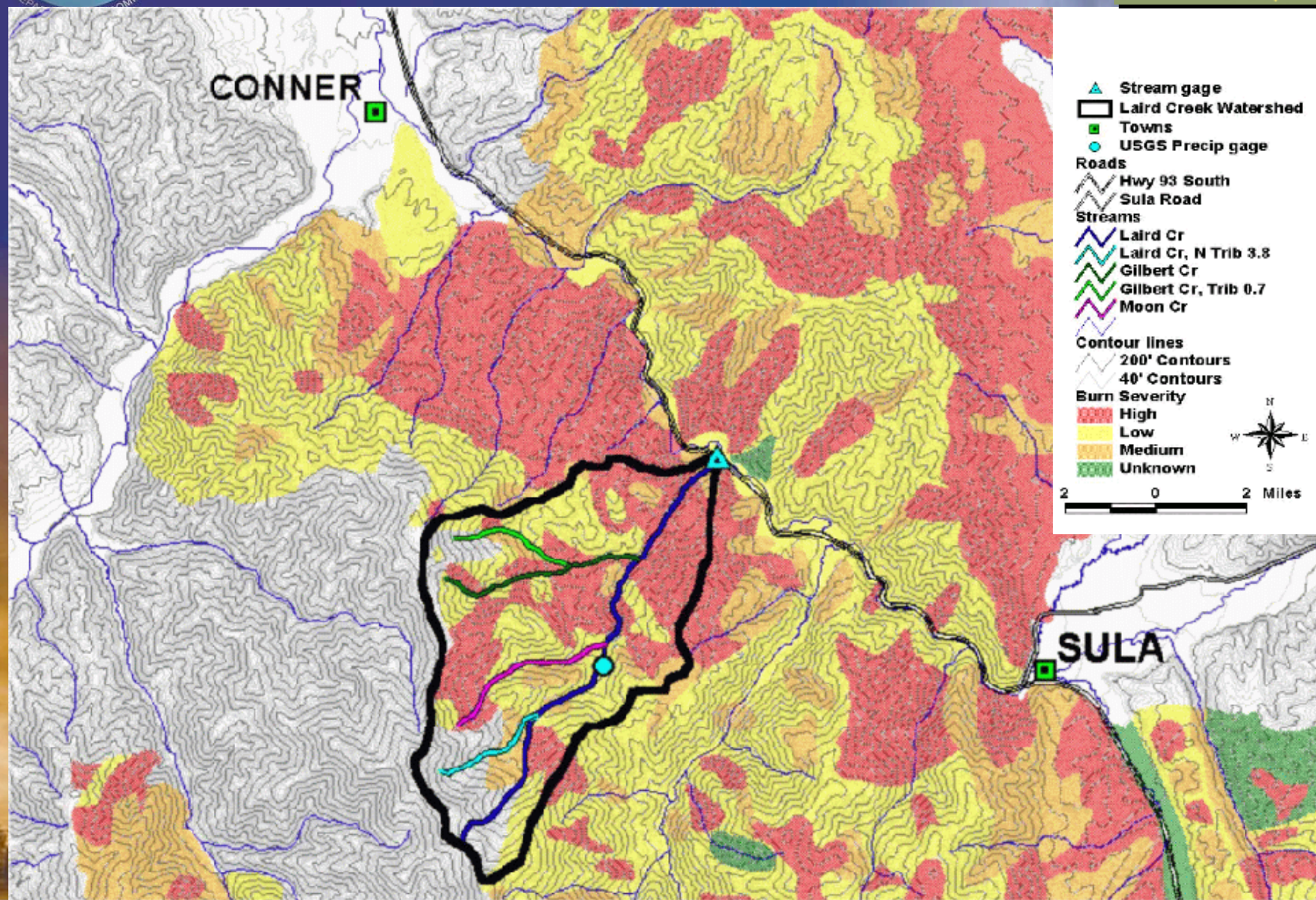


Map Created: August 5, 2002



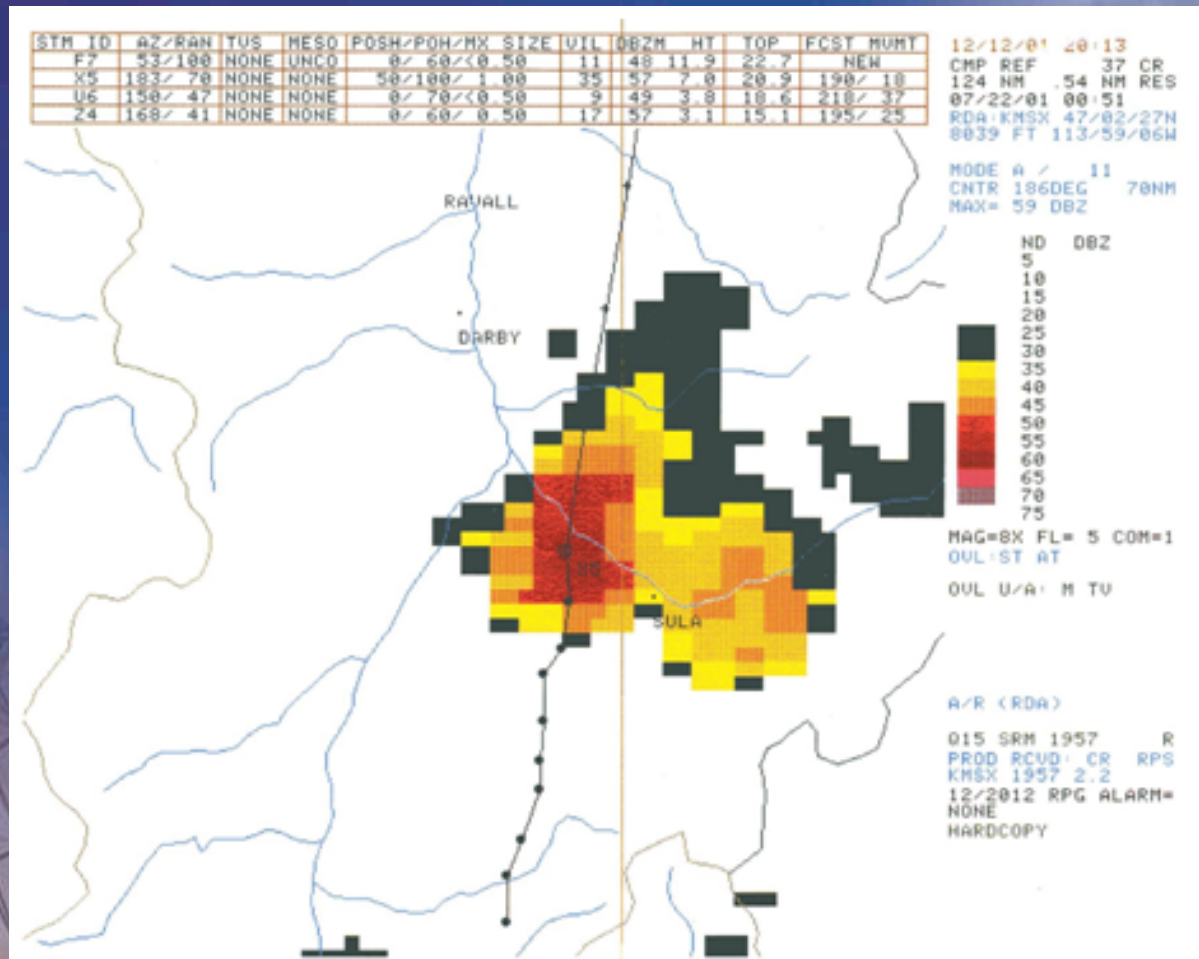


Burn Severity – Bitterroot Fires 2000

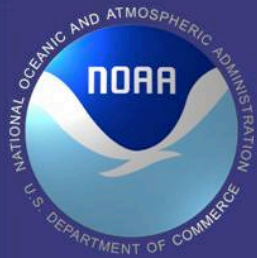




Thunderstorm hits Laird Creek July 2001

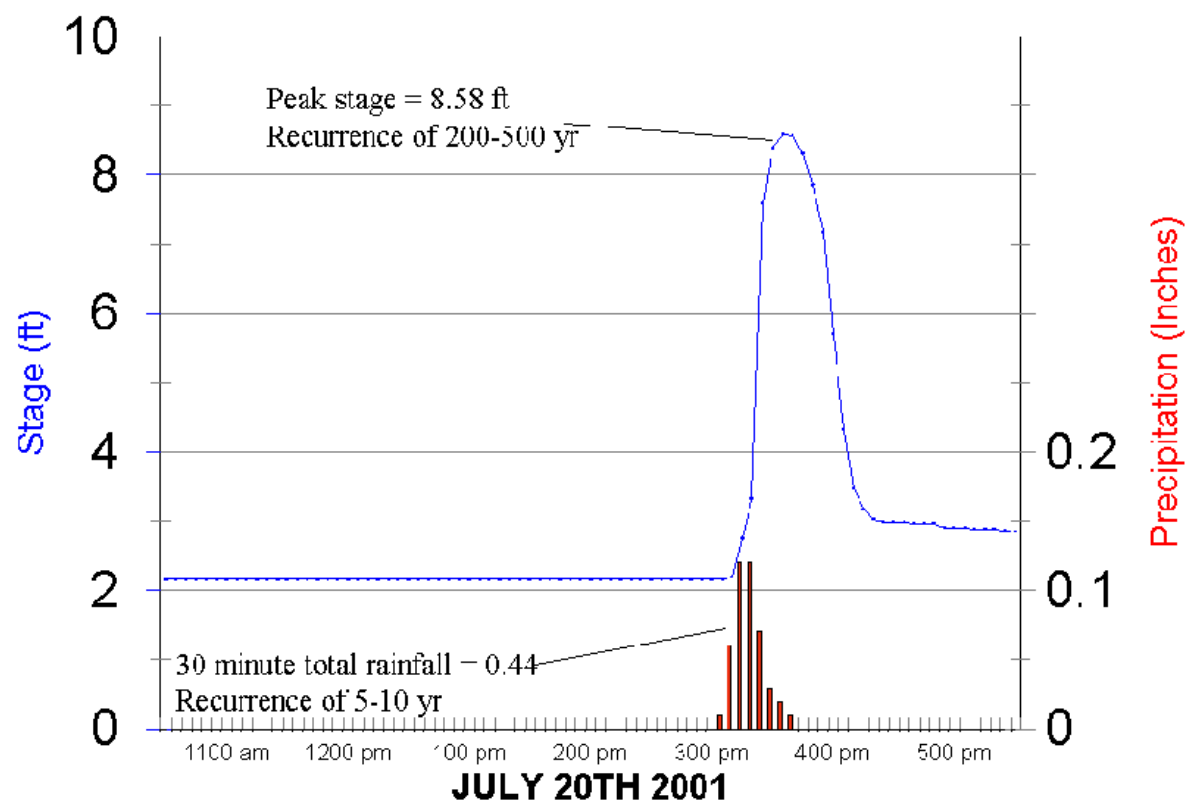


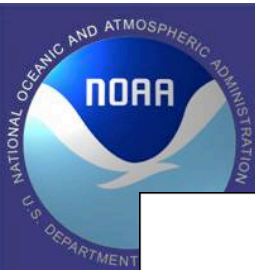
RADAR Reflectivity



LAIRD CREEK - FLASH FLOOD

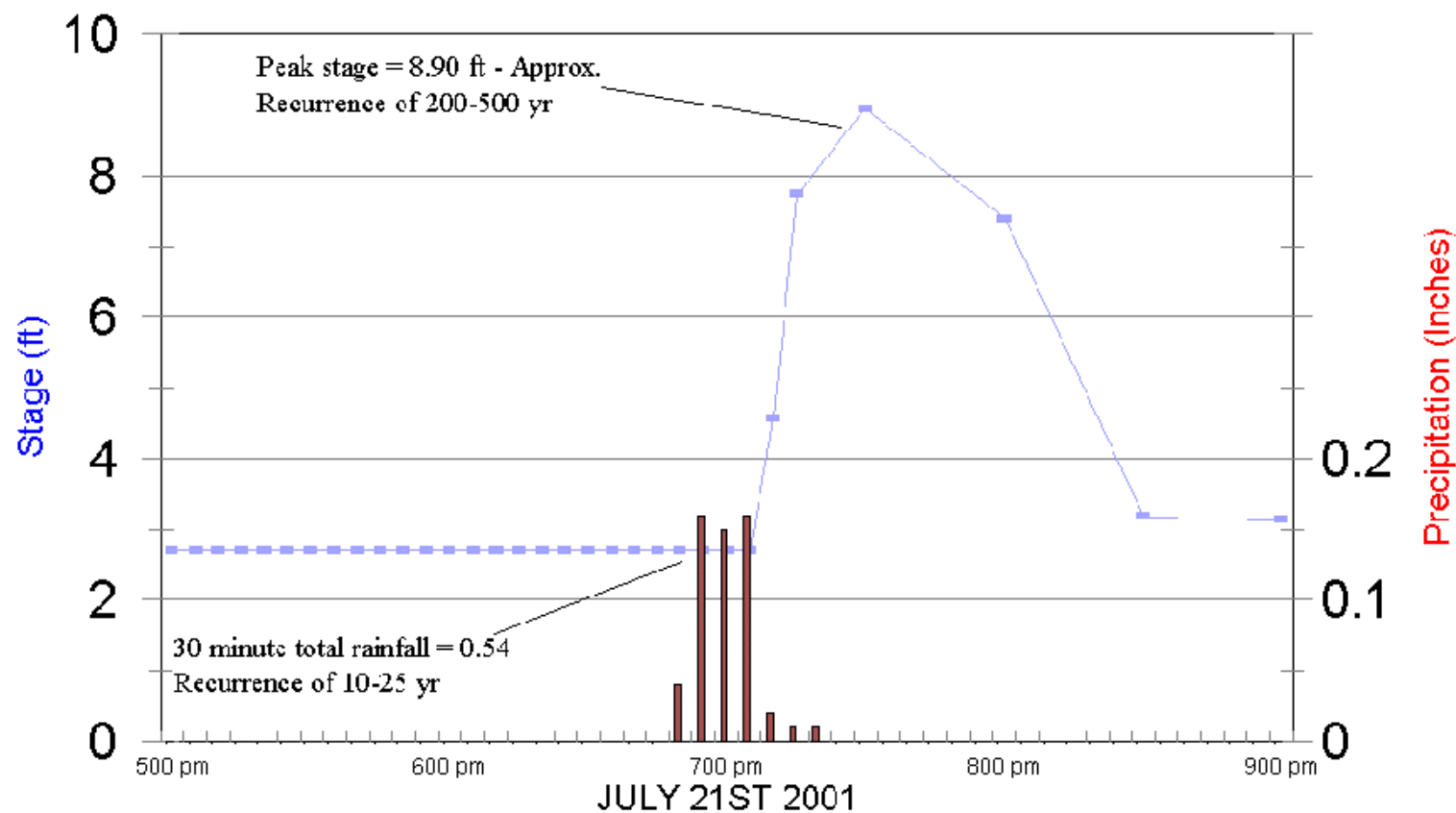
Rainfall & Stage Data





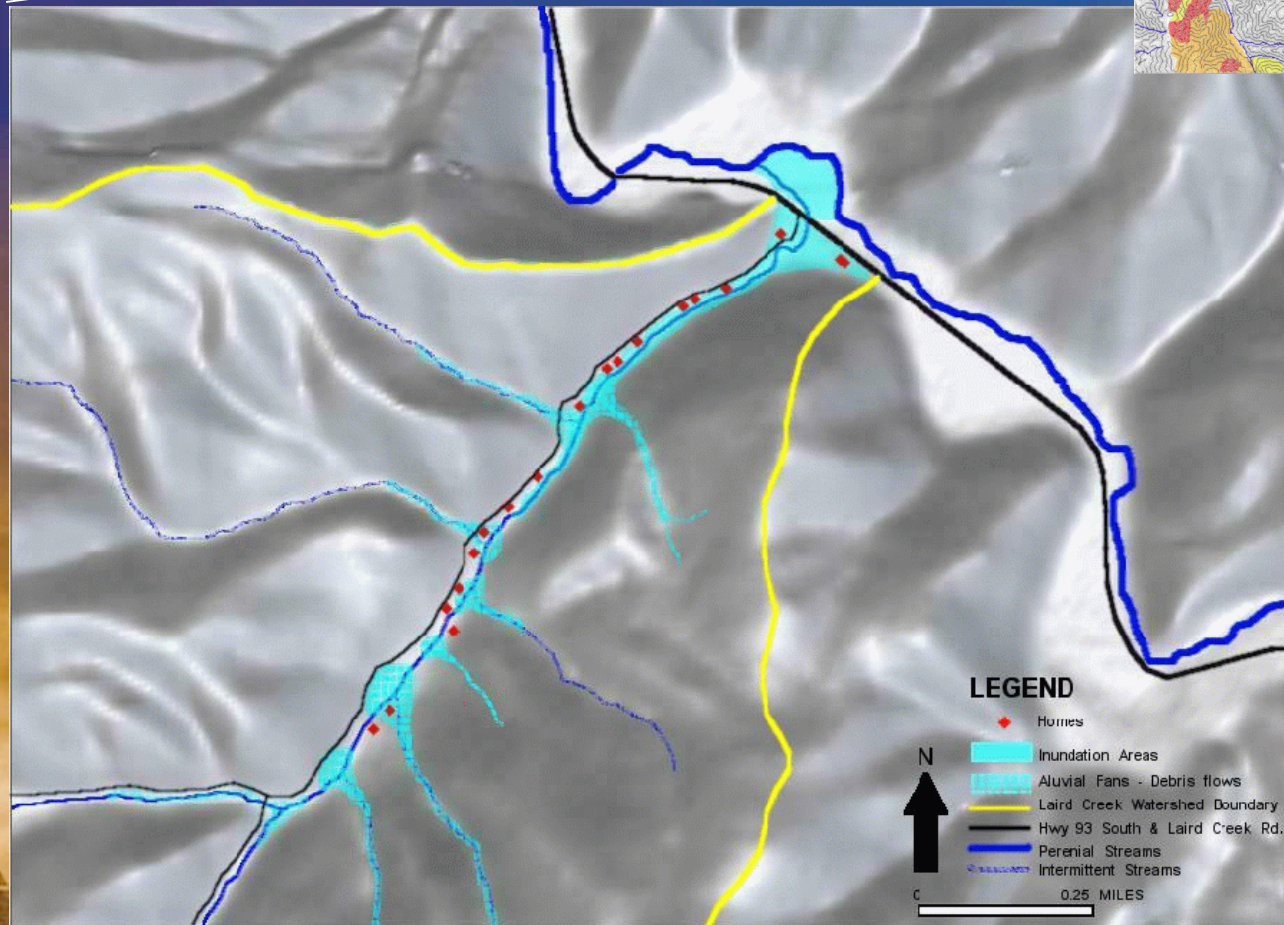
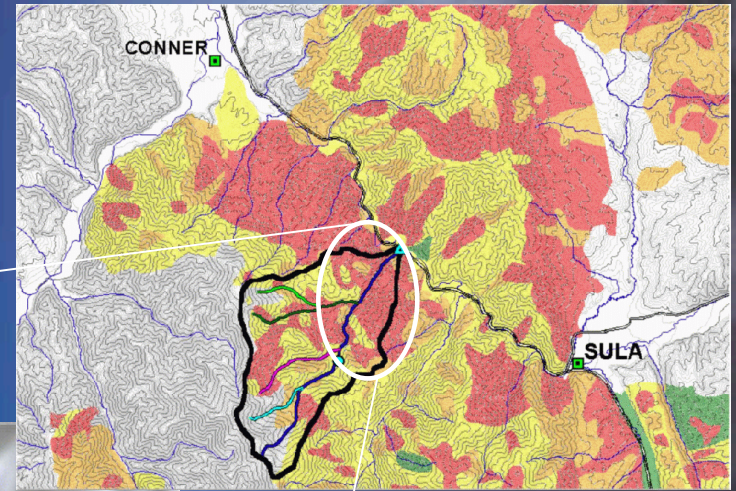
LAIRD CREEK - FLASH FLOOD

Rainfall & Stage Data



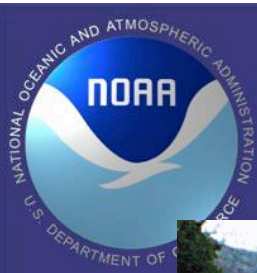


Laird Creek Inundation



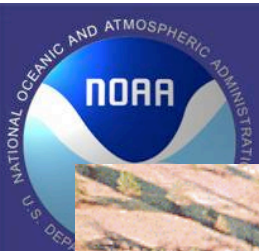
weather.gov

NOAA National Weather Service



Laird Creek (2001 Flash Flood)





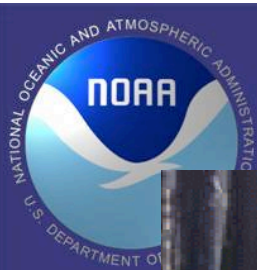
Laird Creek (2001 Flash Flood)





Gully Formation from Hyperconcentrated flow





Laird Creek - Debris from flood





Debris Fan



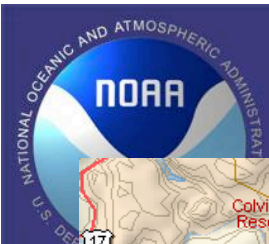


2005 – 2006
(fire) (flood)

Burn Area in Idaho

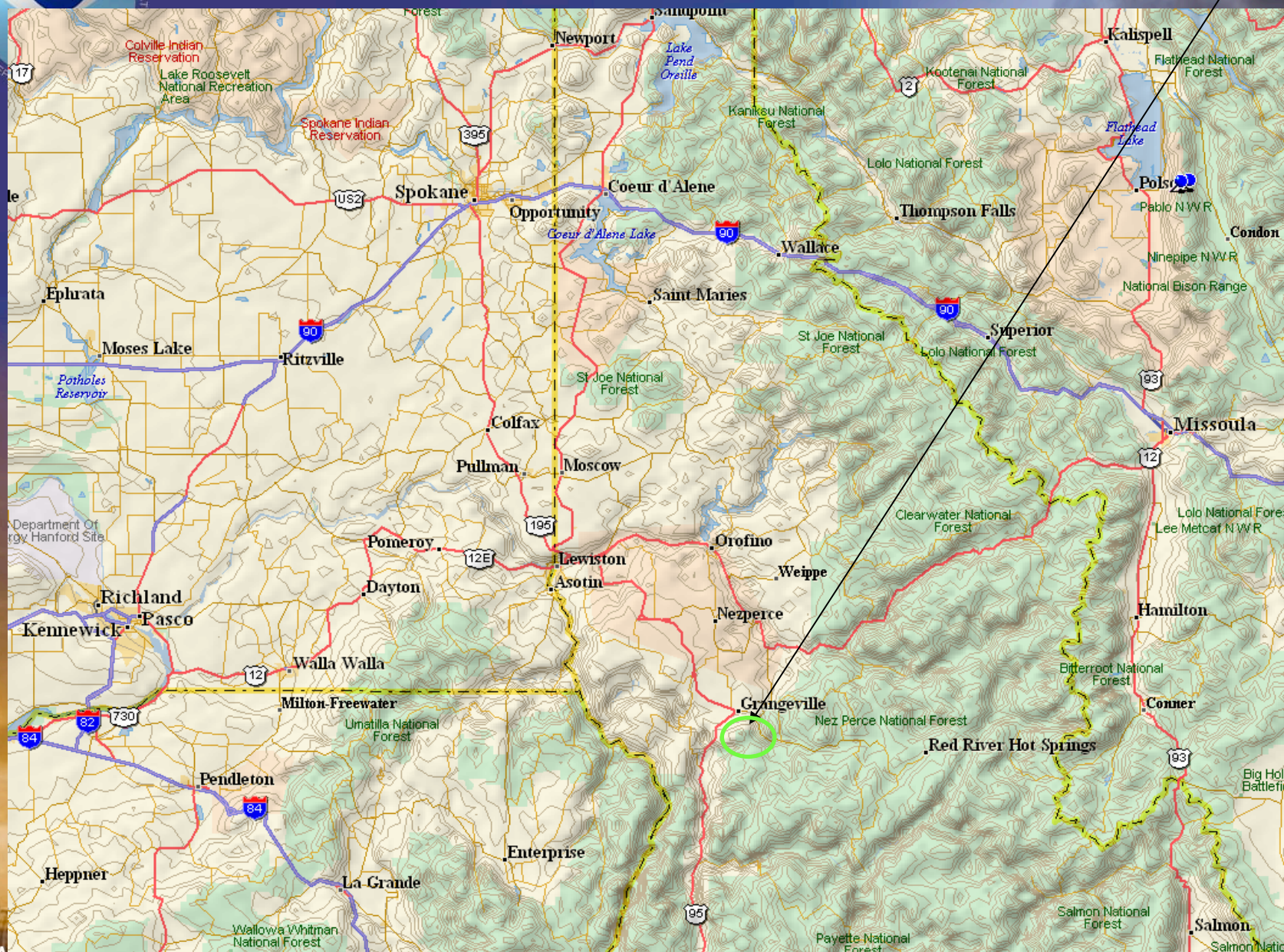
weather.gov

NOAA National Weather Service



Blackerby Burn near Grangeville, ID

Area of Concern





Blackerby Burn Area 2005



Mount Idaho Grade Road

Highway 14

weather.gov

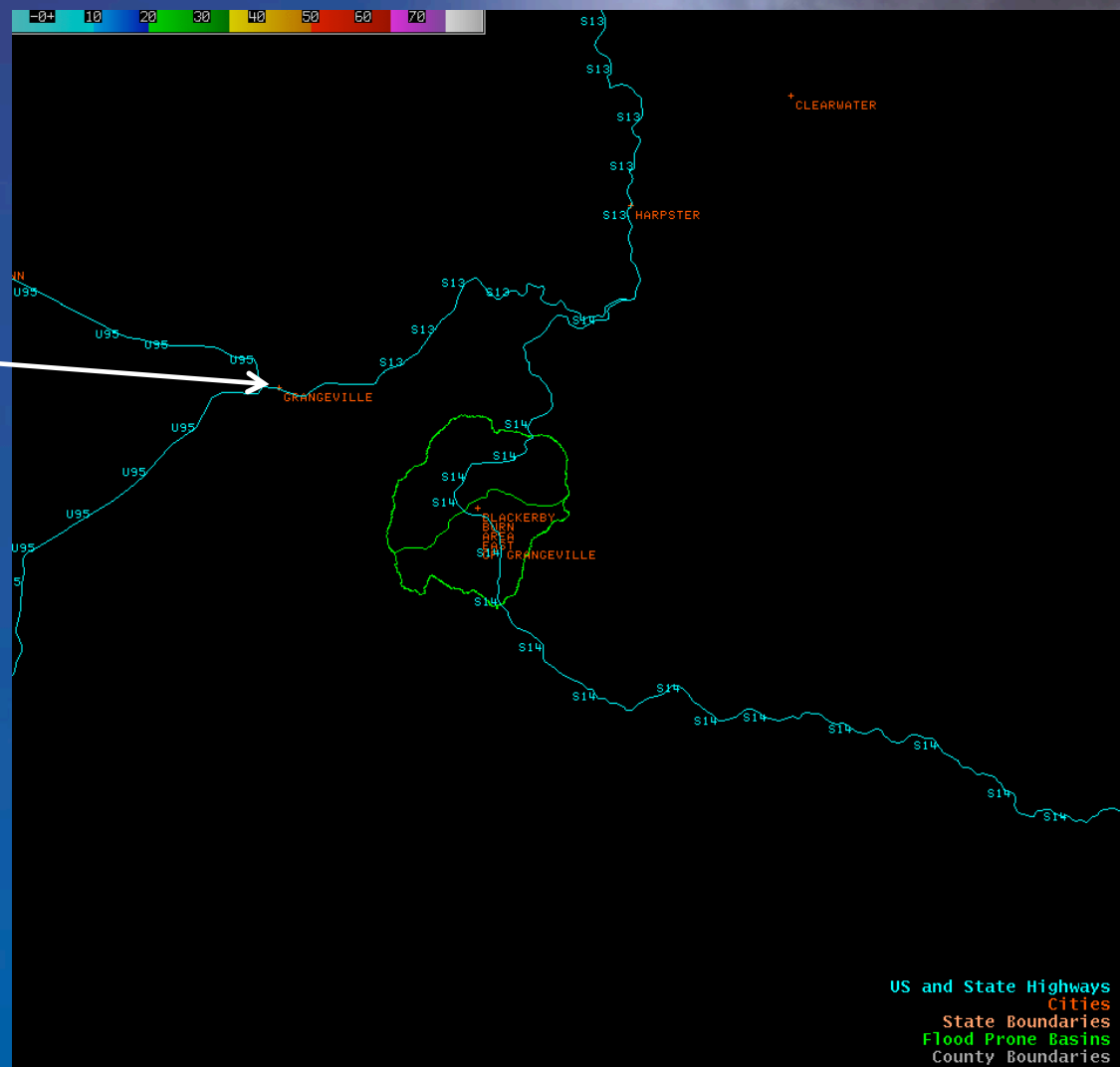
NOAA National Weather Service

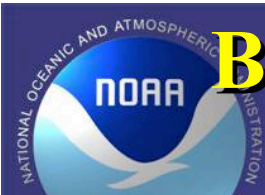


Burn area superimposed on RADAR screen

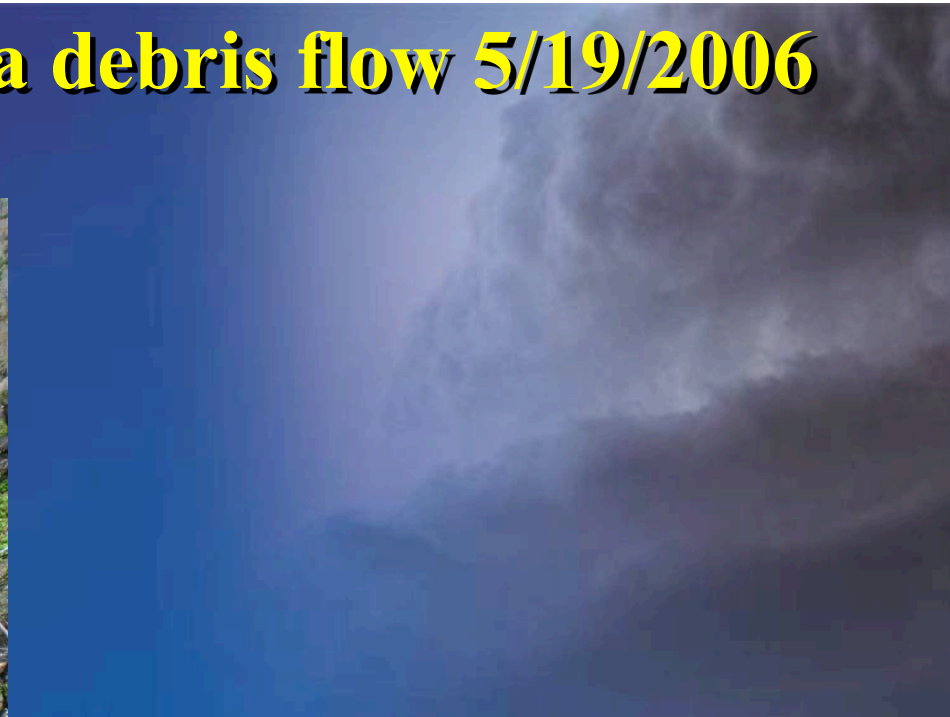
0.78 inches in 30 minutes

May 19, 2006





Blackerby Burn area debris flow 5/19/2006





Small Debris flow from Blackerby Burn area near Grangeville, ID (5/19/06)

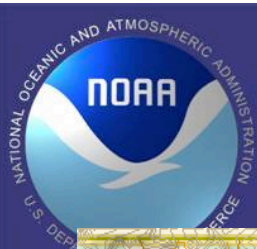


Highway 14

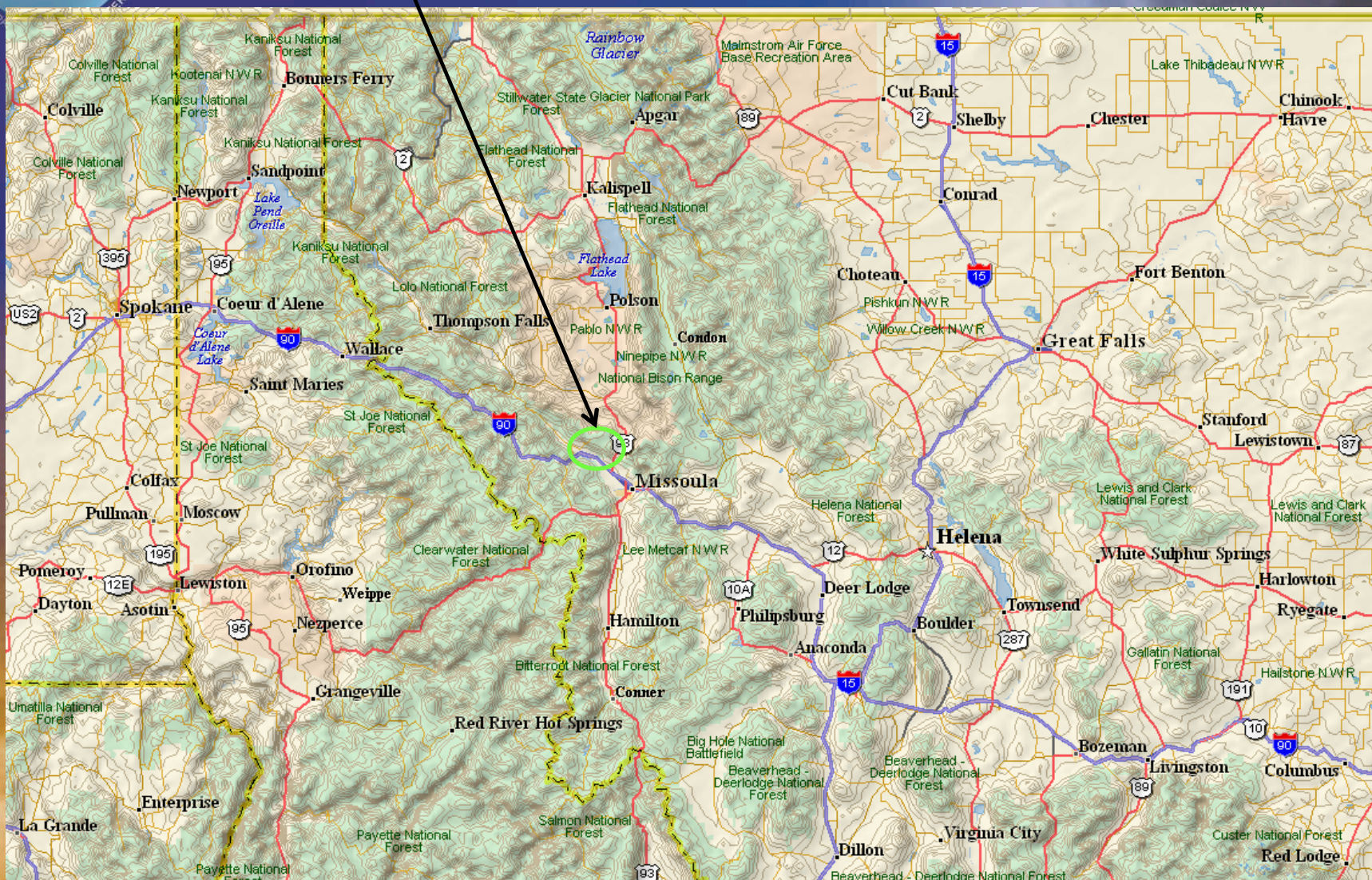


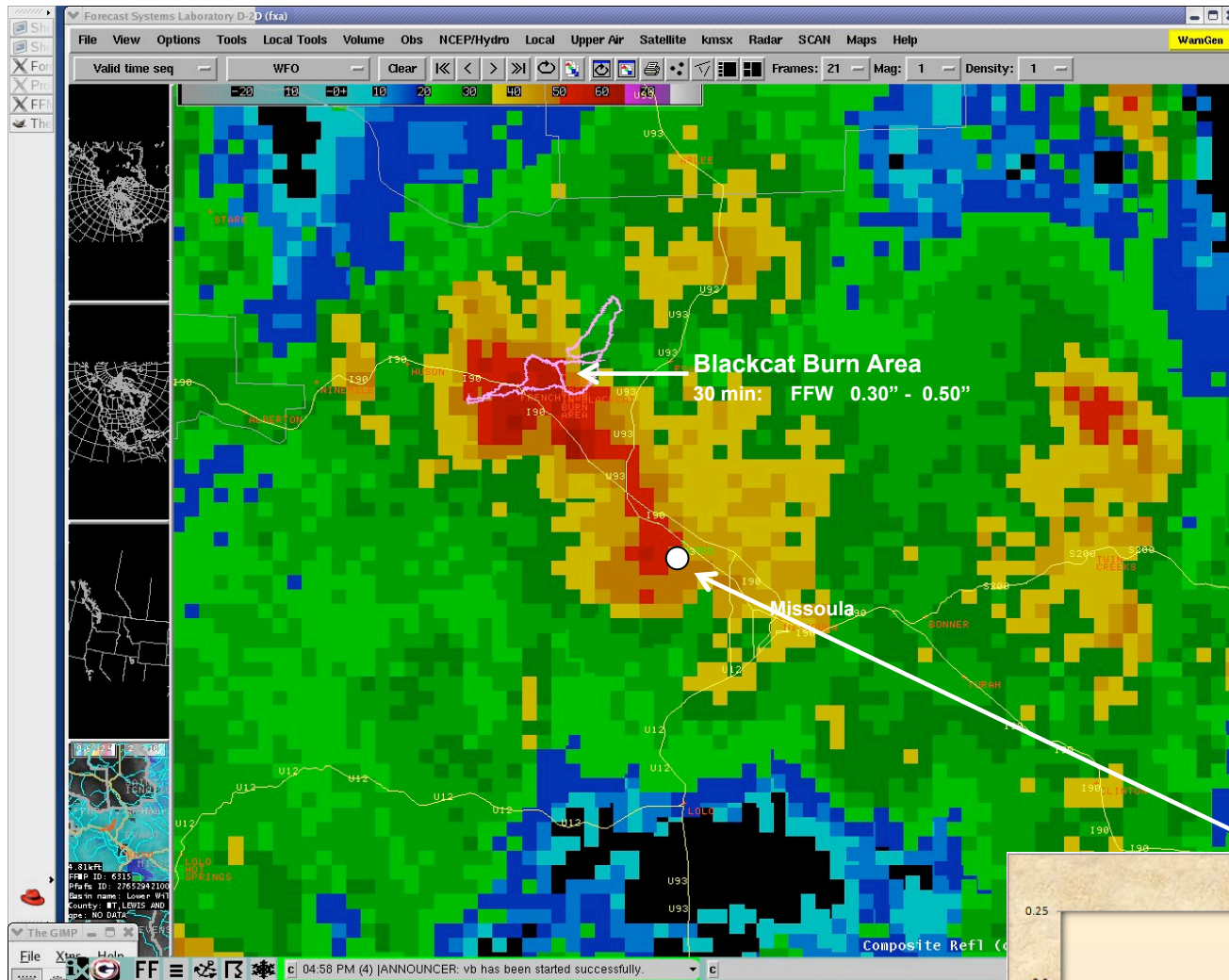
2007 – 2009
(fire) (flood)

Blackcat Burn Area – Western, MT

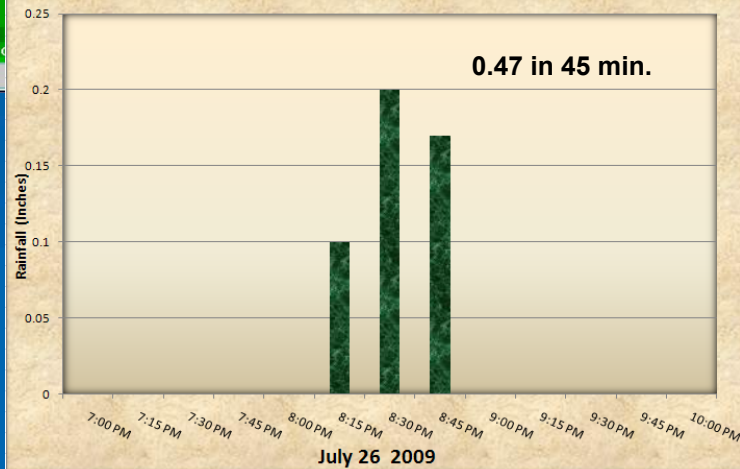


Area of Concern



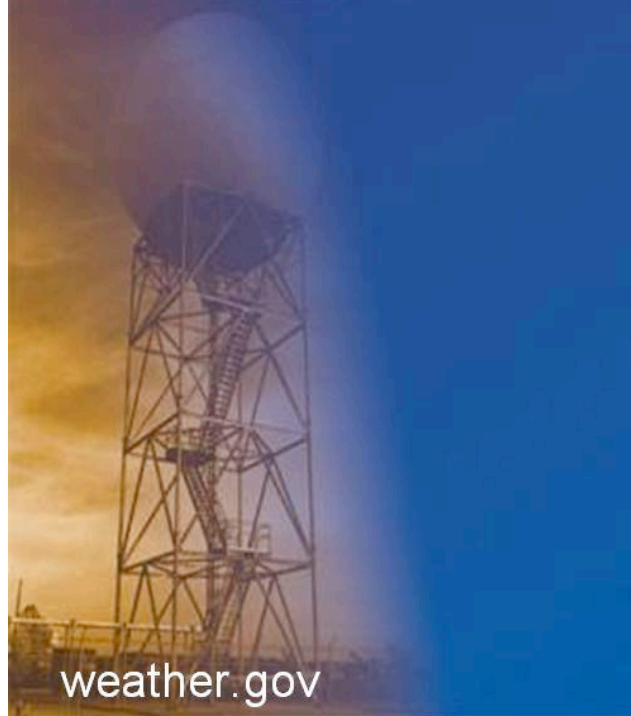


Rainfall from NWS - Office



weather.gov

Blackcat Burn Area Western Montana 2007 - 2009 (fire) (flood)





weather.gov

Flash Flood on July 26, 2009

NOAA National Weather Service



Summary

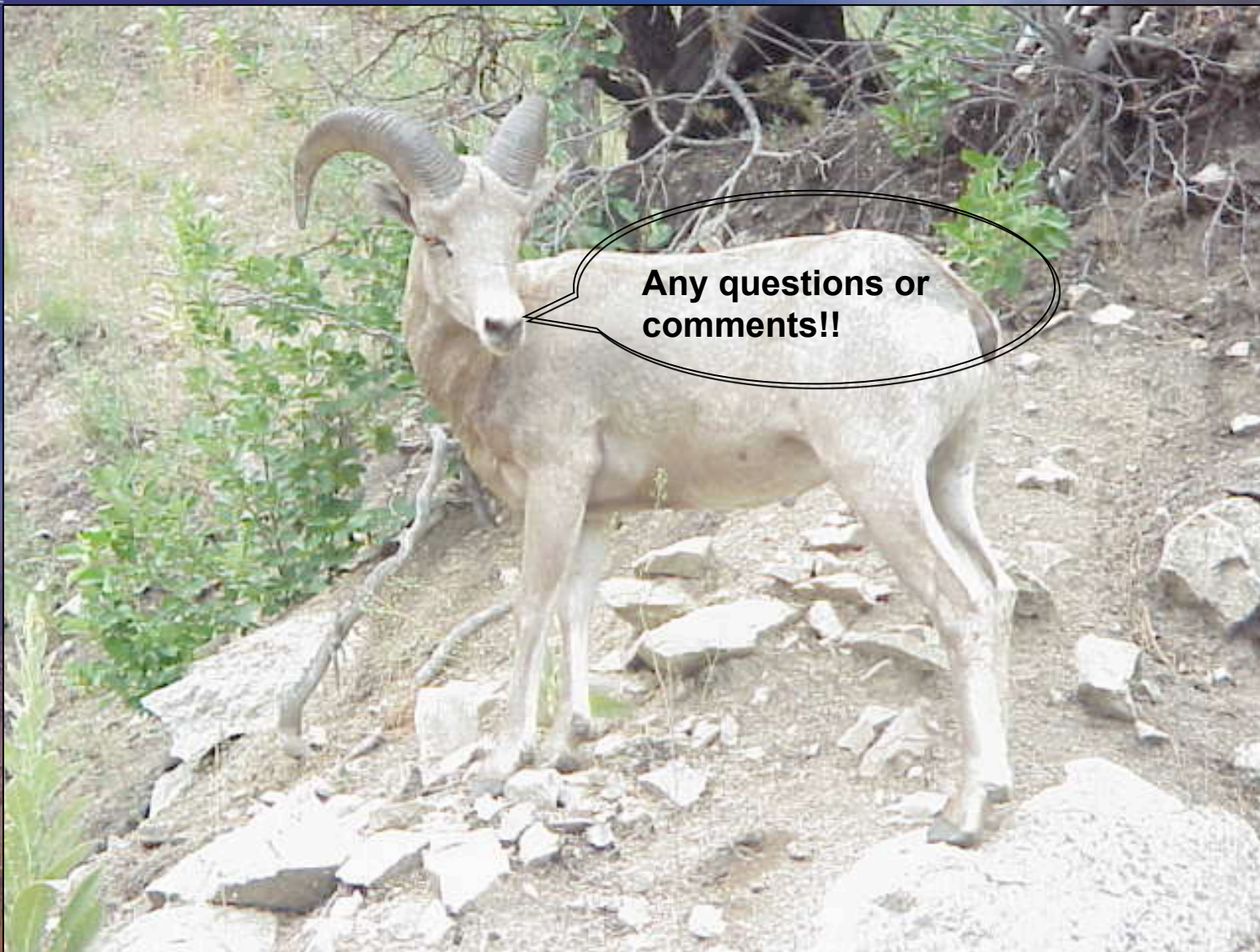
- **Agency coordination needed.**



- **NWS offices need preparation work done.**
 - *Establish - Flash Flood Rainfall criteria*
 - *Expand - spotter precipitation network*
 - *Get word out to affected public*



THE END



**Any questions or
comments!!**